CLAIMS

What is claimed is:

1. An apparatus, comprising:

a polymeric material that abuts one or more sensor fibers, wherein the polymeric material comprises a plurality of voids;

wherein upon an introduction of an applied force to a portion of the polymeric material, one or more of the plurality of voids compress to allow the portion of the polymeric material to absorb a portion of the applied force and promote a decrease of a reaction force from the portion of the polymeric material to one or more of the one or more sensor fibers.

2. The apparatus of claim 1, wherein the compression of the one or more of the plurality of voids promotes a decrease in strain of the one or more of the one or more sensor fibers due to contact with the polymeric material.

3. The apparatus of claim 1, wherein the plurality of voids in the polymeric material promote a decrease in a bulk modulus of the polymeric material.

4. The apparatus of claim 1, wherein upon a change in temperature, the plurality of voids in the polymeric material promote a decrease in a thermal pressure induced on the one or more sensor fibers by the polymeric material.

5. The apparatus of claim 1, wherein the polymeric material comprises a potting compound, wherein the potting compound encapsulates the one or more sensor fibers.

6. The apparatus of claim 1, wherein the one or more sensor fibers comprise a sensor fiber coil, wherein the polymeric material comprises a potting compound that encapsulates the sensor fiber coil;

wherein the sensor fiber coil comprises a first coil portion and a second coil portion, wherein a portion of the potting compound separates the first coil portion and the second coil portion, wherein the portion of the potting compound comprises the one or more of the plurality of voids;

wherein the one or more of the plurality of voids compress to allow the portion of the potting compound to absorb the portion of the applied force from one or more of the first coil portion and the second coil portion.

7. The apparatus of claim 6, wherein the one or more of the plurality of voids compress to promote the decrease of the reaction force from the portion of the potting compound to the first coil portion, wherein the reaction force is generated in response to the applied force from the second coil portion.

8. The apparatus of claim 6, wherein the one or more of the plurality of voids compress to promote the decrease of the reaction force from the portion of the potting compound to the first coil portion, wherein the reaction force is generated in response to the applied force from the first coil portion.

9. The apparatus of claim 6, wherein upon an expansion of the sensor fiber coil, the first coil portion and the second coil portion exert the applied force on the portion of the potting compound;

wherein the one or more of the plurality of voids compress to promote a decrease of strain in the first coil portion and the second coil portion due to contact with the portion of the potting compound.

10. The apparatus of claim 6, wherein first coil portion and the second coil portion comprise adjacent layers of the sensor fiber coil, wherein the first coil portion and the second coil portion are separated by a distance;

wherein the one or more of the plurality of voids in the portion of the potting compound comprise a diameter that is smaller than the distance.

11. The apparatus of claim 1, wherein a distribution of the plurality of voids is substantially uniform within the polymeric material.

12. The apparatus of claim 1, wherein the one or more sensor fibers comprise a sensor fiber coil of a fiber optic gyroscope, wherein the sensor fiber coil senses a rate of rotation for the fiber optic gyroscope.

13. The apparatus of claim 12, wherein the compression of the one or more of the plurality of voids promotes a decrease in a rotation sensing bias error of the fiber optic gyroscope through promotion of a decrease in a pressure exerted on the sensor fiber coil by the polymeric material.

14. The apparatus of claim 1, wherein the plurality of voids comprise a plurality of hollow elastomeric microspheres.

15. An apparatus, comprising:

a fiber optic sensing coil of a fiber optic gyroscope, wherein one or more portions of the fiber optic sensing coil are coated with a potting material that comprises a plurality of voids;

wherein upon contact with the fiber optic sensing coil, the plurality of voids compress to promote a decrease in a strain on the fiber optic sensing coil, wherein the decrease in the strain on the fiber optic sensing coil promotes a decrease in a bias error of the fiber optic sensing coil.

16. The apparatus of claim 15, wherein fiber optic sensing coil comprises one or more optical fibers wound about a spool in a plurality of layers, wherein the plurality of layers comprise a first layer and a second layer; wherein a portion of the potting material comprises a buffer between the first layer and the second layer;

wherein the portion of the potting material comprises one or more of the plurality of voids, wherein the one or more of the plurality of voids promote a decrease in pressure exerted between the first layer and the second layer.

17. A method, comprising the steps of:

buffering one or more sensor fibers in abutment with a polymeric material through employment of a portion of the polymer material that comprises a plurality of voids to absorb a portion of an applied force; and

accommodating compression of one or more of the plurality of voids in response to the applied force to promote a decrease in a reaction force from the polymeric material to one or more of the one or more sensor fibers.

18. The method of claim 17, wherein the polymeric material comprises a potting compound, wherein the step of buffering the one or more sensor fibers in abutment with the polymeric material through employment of the portion of the polymer material that comprises the plurality of voids to absorb the portion of the applied force comprises the steps of:

applying the potting compound to a sensor fiber of the one or more sensor fibers contemporaneously with winding the sensor fiber into a sensor fiber coil; and

buffering a first coil portion from an adjacent second coil portion of the sensor fiber coil with a portion of the potting compound that comprises one or more of the plurality of voids.

19. The method of claim 18, wherein upon an expansion of the sensor fiber coil, one or more of the first coil portion and the second coil portion exert the applied force on the portion of the potting compound, wherein the step of buffering the first coil portion from the adjacent second coil portion of the fiber optic coil with the portion of the potting compound that comprises the one or more of the plurality of voids comprises the step of:

promoting a decrease of strain in one or more of the first coil portion and the second coil portion due to contact with the portion of the potting compound.

20. The method of claim 18, further comprising the steps of:

employing the sensor fiber coil as a rate of rotation sensor in a fiber optic gyroscope; and

promoting a decrease in a rotation sensing bias error of the fiber optic gyroscope by promoting a decrease in a pressure exerted on the sensor fiber coil by the potting compound.

21. The method of claim 17, wherein the polymeric material comprises a potting compound, wherein the step of buffering the one or more sensor fibers in abutment with the polymeric material through employment of the portion of the polymer material that comprises the plurality of voids to absorb the portion of the applied force comprises the steps of:

applying the potting compound to one or more support faces of a spool;

winding a sensor fiber of the one or more sensor fibers around the spool to generate a sensor fiber coil; and

buffering a coil portion of the sensor fiber coil from one or more of the one or more support faces of the spool with a portion of the potting compound that comprises one or more of the plurality of voids.

22. The method of claim 17, wherein the step of accommodating compression of the one or more of the plurality of voids in response to the applied force to promote the decrease in the reaction force from the polymeric material to one or more of the one or more sensor fibers comprises the step of:

promoting a decrease of strain in one or more of the one or more sensor fibers due to contact with the polymeric material.

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